

REMARKS/ARGUMENTS

Reconsideration and withdrawal of the rejections of the application and consideration and entry of this paper are respectfully requested in view of the herein remarks, which place the application in condition for allowance.

I. STATUS OF THE CLAIMS AND FORMAL MATTERS

Claims 1-8, 10, 12, and 15-19 are currently pending. Claims 1-7 were previously withdrawn from this application in a response to a restriction requirement. Claims 9, 11, 13, and were cancelled in a previous response.

Claim 8 is hereby amended and claim 12 cancelled. Claim 20 is new. No new matter has been introduced. Support for this amendment is provided throughout the Specification as originally filed, for example, claim 12 and page 11, lines 9-12, page 12, lines 11-16, and Figs 2 and 3. Support for the new claim can be found, for example, at page 12, lines 16-18.

II. REJECTIONS UNDER 35 U.S.C. § 103

Claims 8, 10, 12, and 15-19 are rejected under 35 U.S.C. § 103(a) as unpatentable over U.S. Patent No. 4,728,882 to Stanbro et al. ("Stanbro") in view of U.S. Patent No. 5,747,669 to Suzuki ("Suzuki") and in further view of U.S. Patent No. 5,522,980 to Hobbs et al. ("Hobbs").

Applicant respectfully traverses for at least the following reasons.

Independent claim 8 recites, *inter alia*:

An alcohol concentration sensor of an electrostatic capacitance type for measuring an alcohol concentration in fuel for internal combustion engine mixed with alcohol, comprising:

an insulating substrate...

a resin mold...

wherein the insulating substrate is made of a material showing a specific dielectric constant of not higher than 5, and each of the pair of electrodes is at least partly covered by an insulating protective film having a thickness between 0.4 and 1 μm ,

wherein the insulating protective film is made of a material showing a specific dielectric constant of not higher than 5, and

wherein the resin mold exposes to the outside at least a part of the surface of the insulation substrate with the electrodes and insulating protective film formed thereon, so that the insulating protective film covers the electrodes, and the insulating protective film is configured to be brought into contact with the fuel for an internal combustion engine mixed with alcohol.

Accordingly, the claimed invention is directed to an **alcohol concentration sensor** comprising, *inter alia*, an insulating substrate between 200 and 1,000 μm thick made from a material having a specific dielectric constant of no greater than 5, a pair of electrodes covered by an insulating protective film 0.4 to 1 μm thick and made from a material having a dielectric constant not greater than 5, in which the insulating protective film for the electrodes is configured to be brought into contact with a fuel/alcohol mixture for an internal combustion engine.

As presently understood by Applicants, Stanbro discloses a sensor for determining the presence of trace hydrocarbon analytes, such as cyclohexane, benzene, pentane, hexane, and heptane. *Stanbro*, column 2, lines 7-9, column 5, lines 3-6. Stanbro indicates that isopropyl alcohol is used to prepare the fluid medium, but the detection achieved by the device of Stanbro is not of the isopropyl alcohol, but rather on the hydrocarbon analyte. In fact, Stanbro recites,

“experimentation showed no response of the sensor to alcohol” in a 1% solution of a hydrocarbon analyte in isopropyl alcohol. *Id.*, column 4, lines 55-60 (emphasis added).

The claimed invention is directed to **an alcohol concentration sensor** and described throughout the original specification as adapted for measuring the alcohol concentration in fuel for internal combustion engines, particularly concentrations in the range of 0-5%.

Accordingly, because the device in Stanbro shows no response to alcohol, it would be ill suited as an alcohol concentration sensor for measuring alcohol concentration in fuel for internal combustion engine mixed with alcohol as presently claimed.

As amply presented in the response of April 28, 2010, Stanbro requires “an active or concentrating layer...that coats the two insulated conductors.” *Stanbro*, column 2, lines 21-23. This novel feature of Stanbro (*Id.*, column 3, lines 11-16) is found in all embodiments disclosed.

In contrast, the presently claimed alcohol concentration sensor has no such limitation.

The inventive concentration sensor as presently claimed includes **insulating substrate is made of a material showing a specific dielectric constant of not higher than 5**. Page 3 of the Office Action asserts that Stanbro discloses “additional, low dielectric constant materials as layers that comprise their substrate such as dielectric silicone rubber which has a dielectric constant of approximately 3,” citing to column 7, lines 18-20 of the reference. However, Applicant submits the silicone rubber layer disclosed in Stanbro is the active layer and not the **insulating substrate** as claimed. Fig. 1 and column 4, lines 8-16 of Stanbro discloses an electrically insulating material (16) coats the electrodes and an active layer (18) is placed over the insulating material. The active layer is selected to have a high affinity for non-polar molecules, and may be chosen from various polymeric coatings such as silicone rubber.

In the text describing the experimental procedure, particularly step 2 beginning at line 44, Stanbro discloses the sensor of step 1 was dipped in a solution of silicone rubber and allowed to dry. As is generally understood, dipping the sensor would result in all surfaces being coated with the silicon solution, absent specific steps to mask or protect portions from the coating. Stanbro lacks these specific steps. Accordingly, the silicone coating is applied to the electrically insulating material coating the electrodes and cannot also be the insulating substrate.

As the active layer (18) is the only silicone layer disclosed in Stanbro, the silicone rubber cited in the Office Action must pertain to the active layer and *not* the **insulating substrate** as claimed.

In the first full paragraph on page 3, the Office Action concedes that Stanbro fails to teach a resin mold cover and an insulating substrate made from a material showing a specific dielectric constant of not higher than 5. The Office Action asserts that Suzuki teaches these features.

Initially, Applicants submit the device disclosed in Suzuki is not a sensor of an electrostatic capacitance type and, in particular, is not an alcohol concentration sensor of an electrostatic capacitance type for measuring an alcohol concentration on fuel for internal combustion engines mixed with alcohol as claimed.

Page 4 of the Office Action asserts that it would be obvious to use the glass substrate of Suzuki as a substrate in the device of Stanbro, and using the glass substrate would eliminate the need for additional insulating layers such as the rubber layer of Stanbro. Applicants respectfully disagree.

Assuming, arguendo, that the Suzuki teaches the use of glass as an insulating substrate, Stanbro still requires the use of an active layer, which is the outer layer of silicone. The only

experimental procedure presented and all of the embodiments disclosed include the second layer (18) consistently described as the active layer. The reference fails to disclose or render predictable a sensor that does not include the silicone active layer. To eliminate the active layer would improperly change the method of operation of Stanbro. As explained at M.P.E.P.

§2143.01:

If the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious. In re Ratti, 270 F.2d 810, 123 USPQ 349 (CCPA 1959) (Claims were directed to an oil seal comprising a bore engaging portion with outwardly biased resilient spring fingers inserted in a resilient sealing member. The primary reference relied upon in a rejection based on a combination of references disclosed an oil seal wherein the bore engaging portion was reinforced by a cylindrical sheet metal casing. **Patentee taught the device required rigidity for operation, whereas the claimed invention required resiliency. The court reversed the rejection holding the "suggested combination of references would require a substantial reconstruction and redesign of the elements shown in [the primary reference] as well as a change in the basic principle under which the [primary reference] construction was designed to operate."** 270 F.2d at 813, 123 USPQ at 352.)

Accordingly, because eliminating the silicone rubber layer as suggested by the Examiner would alter the method of operation of the reference, such a modification is not *prima facie* obvious as asserted in the Office Action.

On page 5, the Office Action asserts Hobbs teaches the glass substrate with a thickness of about 0.5 μm , and that it would have been obvious to use such a substrate in the sensor of Stanbro. Applicants respectfully disagree.

Applicants submit that Hobbs is not an alcohol concentration sensor of an electrostatic capacitance type for measuring alcohol concentration in fuel for an internal combustion engine mixed with alcohol. Further, Applicants submit Stanbro is specific in requiring the active layer.

Therefore, one of ordinary skill in the art would not have been motivated to use the glass substrate with a thickness of about 0.5 μm disclosed in Hobbs in the sensor of Stanbro because the sensors of Stanbro and Hobbs operate on quite different measuring principles.

Furthermore, in the present invention, **the resin mold exposes to the outside at least a part of the surface of the insulation substrate with the electrodes and insulating protective film formed thereon, so that the insulating protective film covers the electrodes, and the insulating protective film is configured to be brought into contact with the fuel for an internal combustion engine mixed with alcohol.** Such a structural feature is not disclosed or rendered predictable in Stanbro, Suzuki, or Hobbs. In fact, the insulation protective film (16) of the sensor disclosed in Stanbro is configured specifically to be protected from contact with the liquid medium by the active layer. Neither Suzuki nor Hobbs suggest such an insulating protective film may be brought into contact with fuel for an internal combustion engine mixed with alcohol as required by the present claims

For at least the foregoing reasons, because it is believed that revised independent claim 8 patentably distinguishes over the relied upon portions of Stanbro, Suzuki, and Hobbs, either alone or in combination, and is therefore allowable. Further, claims 10, 12, and 15-19, which depend from claim 8, are allowable as well.

Statements appearing above with respect to the disclosures in the cited references represent the present opinions of the Applicants' undersigned attorney and, in the event that the Examiner disagrees with any such opinions, it is respectfully requested that the Examiner specifically indicate those portions of the respective reference providing the basis for a contrary view.

CONCLUSION

In view of the foregoing, it is believed that the present application is in condition for allowance. Accordingly, Applicants' attorneys respectfully request that a timely Notice of Allowance be issued in this case.

Please charge any fees incurred by reason of this response and not paid herewith to Deposit Account No. 50-0320.

Respectfully submitted,
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